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Term:

l1 and (communicat\$ with between with handheld\$)

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try to get com. bet. 2 handhelds

<u>L9</u>	l1 and (communicat\$ with between with handheld\$)	28	<u>L9</u>
<u>L8</u>	L1 and (handheld with communicat\$ with host).ab.	3	<u>L8</u>
<u>L7</u>	L1 and (handheld with communicat\$ with (updat\$ or merge\$))	3	<u>L7</u>
<u>L6</u>	L1 and (handheld and communicat\$ and (updat\$ or merge\$)).ab.	3	<u>L6</u>
<u>L5</u>	L1 and (handhled with communicat\$).ab.	0	<u>L5</u>
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<u>L1</u>	((709/\$)!.CCLS.)	15629	<u>L1</u>

END OF SEARCH HISTORY

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L9: Entry 22 of 28

File: USPT

Oct 26, 1999

DOCUMENT-IDENTIFIER: US 5974238 A

TITLE: Automatic data synchronization between a handheld and a host computer using pseudo cache including tags and logical data elements

Detailed Description Text (8):

Turning now to FIG. 1E, another communication link between the desktop computer C and the handheld computer H is shown. FIG. 1E shows the wireline technology--Internet combination to augment the wireless networks which may lack a ubiquitous infrastructure. FIG. 1E is similar to FIG. 1D, with the addition that an Internet link is interposed between the desktop computer C and the wireless carrier. In FIG. 1E, the wireless carrier communicates with an Internet service provider via a suitable protocol such as TCP/IP protocol. Originally developed as a reliable computer network for connecting research institutions and military sites, the Internet has become the world's most widely used computing network, where information is quickly and easily shared. Typically, data transmitted via the Internet via the World Wide Web still resembles that of the wireless packets, as the typical Web message size is small. Thus, in addition to wireless carriers, the handheld computer of the present invention can communicate with the desktop computer C via land lines, via wireless lines, or other means, including the Internet and variants thereof, including "intranets", or intra-corporation networks. These communication media meld computing power with network and wireless access, offering users significant leaps in productivity and accessibility.

Detailed Description Text (29):

In FIG. 6A, the synchronization software necessary to communicate synchronized data between the desktop computer C and the handheld computer H is shown in more detail. The synchronization software is the key to the desktop architecture as it contains the various components that together act to maintain data coherency. Turning now to FIG. 6A, the desktop computer C provides a coherency protocol engine 210, a communication engine 212, a data synchronization engine 214, tags 216, a signature table 218, a field map table 220, and a synchronization application programming interface (API) 222, which performs intermediate data transfer between the handheld computer H and the computer system C. Also, the desktop computer C has a plurality of applications, including the scheduler data engine 224, a phone list data engine 228, and a travel agent data engine 232, among others, as previously discussed. The communication port 212 communicates with the coherency protocol engine 210, which communicates with the data synchronization engine 214. The data synchronization engine 214 in turn communicates with tags 216 and the synchronization API 222. The tags 216 are coupled to the signature table 218 and the field mapping table 220. The synchronization API 222 is connected to data engines 224, 228 and 232 which communicate respectively with a scheduler personal information manager (PAM) 226, a phone list PIM 230 and a travel agent PIM 234, among other PIMs.

Current US Original Classification (1):709/248Current US Cross Reference Classification (4):709/246

CLAIMS:

15. A method for communicating data records between a handheld computer and a host computer, the handheld computer and host computer each having at least one common data set including logical data elements of a user database, each computer having copies of the common data set, the method comprising the steps of:

providing a pseudo cache having tag entries in the handheld computer corresponding to the logical data elements;

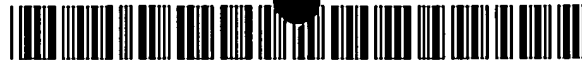
establishing a communication link between the handheld computer and the host computer in response to a change of a pseudo cache tag entry;

synchronizing data records stored by the handheld computer and the host computer, said synchronizing steps including:

searching tag entries of the pseudo cache for shared data records; and

modifying one or more of the tag entries coupled to said pseudo cache;

resolving any differences in the copies and storing identical copies of the common data set in the host computer and in the handheld computer.



US005974238A

United States Patent [19]

Chase, Jr.

[11] Patent Number: 5,974,238
[45] Date of Patent: Oct. 26, 1999

[54] **AUTOMATIC DATA SYNCHRONIZATION BETWEEN A HANDHELD AND A HOST COMPUTER USING PSEUDO CACHE INCLUDING TAGS AND LOGICAL DATA ELEMENTS**

[75] Inventor: **Charlie David Chase, Jr.**, Spring, Tex.

[73] Assignee: **Compaq Computer Corporation**, Houston, Tex.

[21] Appl. No.: **08/689,304**

[22] Filed: **Aug. 7, 1996**

[51] Int. Cl.⁶ **G06F 1/00; G06F 15/00; G06F 17/30; G06F 15/62**

[52] U.S. Cl. **395/200.78; 395/200.76; 395/821; 395/892; 395/893; 707/200; 707/203; 707/204**

[58] Field of Search **395/200.78, 200.76, 395/821, 892, 893; 707/200, 203, 204**

[56] **References Cited**

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(List continued on next page.)

Primary Examiner—Zarni Maung

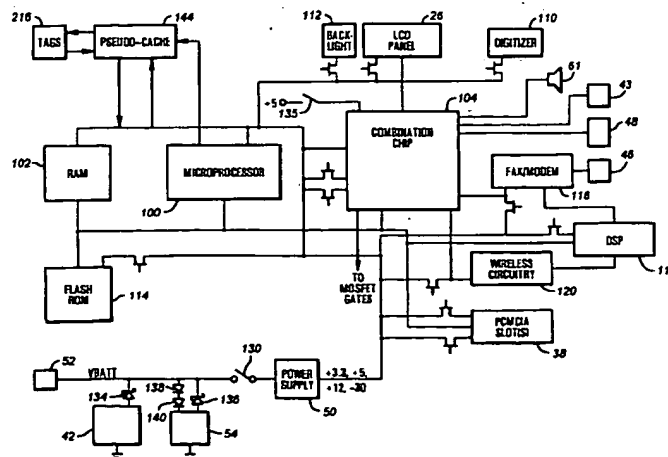
Assistant Examiner—William D. Thomson

Attorney, Agent, or Firm—Akin, Gump, Strauss, Hauer & Feld, LLP

[57] **ABSTRACT**

An apparatus is disclosed for performing dynamic synchronization between data stored in a handheld computer and a host computer, each having a plurality of data sets including at least one common data set, each computer having a copy of the common data set. The handheld computer has a processor, a communication port, and a data synchronization engine. The data synchronization engine has a pseudo-cache and one or more tags connected to the pseudo cache. Data is synchronized whenever data is written to main memory and/or when the associated pseudo-cache tag is invalidated. By strict adherence to a set of protocols, data coherency is achieved because the system always knows who owns the data, who has a copy of the data, and who has modified the data. The data synchronization engine resolves any differences in the copies and allows the storage of identical copies of the common data set in the host computer and in the handheld computer.

25 Claims, 25 Drawing Sheets



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L9: Entry 23 of 28

File: USPT

Sep 28, 1999

DOCUMENT-IDENTIFIER: US 5960403 A

**** See image for Certificate of Correction ****

TITLE: Health management process control system

Detailed Description Text (10):

An even further advantage of using a compact video game system for handheld microprocessor 12 is that such video game systems include means for easily establishing the electrical interconnection provided by cable 14. In particular, such compact video game systems include a connector 40 mounted to the game unit housing and a cable that can be connected between the connectors of two video game units to allow interactive operation of the two interconnected units (i.e., to allow contemporaneous game play by two players or competition between players as they individually play identical but separate games). The cable supplied with handheld microprocessor unit 12 can be used as cable 14 to establish serial data communication between the handheld microprocessor unit 12 (compact video game system) and data management unit 10.

Current US Cross Reference Classification (3):709/208

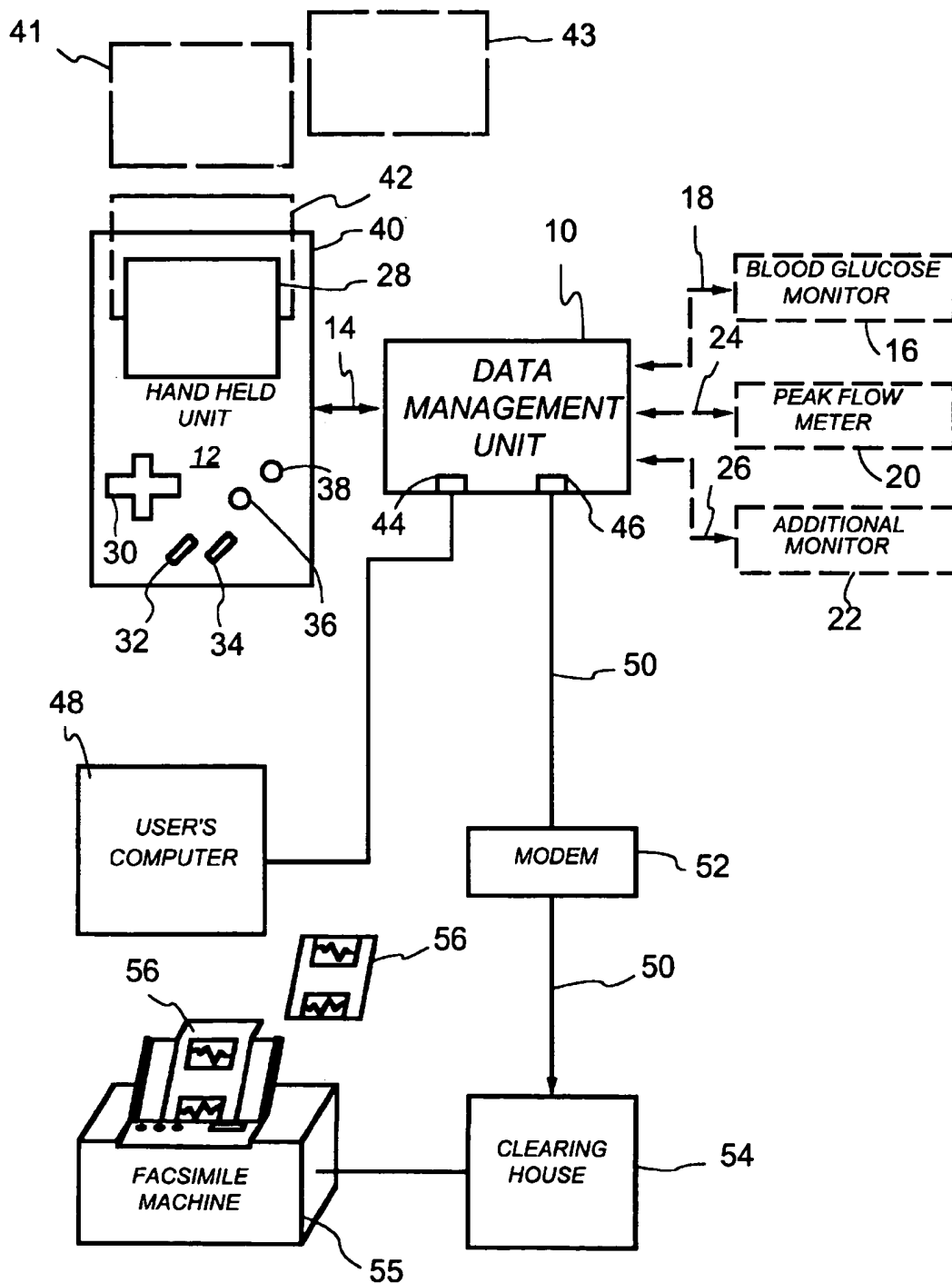


FIG. 1A

WEST**Freeform Search****Database:**

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Term:

(handheld adj1 personal adj1 computer).ab.

Display: **Documents in Display Format:** **Starting with Number** **Generate:** ☐ Hit List ☒ Hit Count ☐ Side by Side ☐ Image

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<u>L10</u>	(handheld with (personal adj1 computer))	383	<u>L10</u>
<u>L9</u>	11 and (communicat\$ with between with handheld\$)	28	<u>L9</u>
<u>L8</u>	L1 and (handheld with communicat\$ with host).ab.	3	<u>L8</u>
<u>L7</u>	L1 and (handheld with communicat\$ with (updat\$ or merge\$))	3	<u>L7</u>
<u>L6</u>	L1 and (handheld and communicat\$ and (updat\$ or merge\$)).ab.	3	<u>L6</u>
<u>L5</u>	L1 and (handhled with communicat\$).ab.	0	<u>L5</u>
<u>L4</u>	L1 and ((handhled with communicat\$) same (updat\$ or merge\$))	0	<u>L4</u>
<u>L3</u>	L1 and (handhled with communicat\$ with (updat\$ or merge\$))	0	<u>L3</u>
<u>L2</u>	L1 and (handhled and communicat\$ and (updat\$ or merge\$)).ab.	0	<u>L2</u>
<u>L1</u>	((709/\$)!.CCLS.)	15629	<u>L1</u>

END OF SEARCH HISTORY

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L11: Entry 1 of 2

File: USPT

Dec 17, 2002

DOCUMENT-IDENTIFIER: US 6496874 B1

TITLE: Method and apparatus for determining position using a handheld personal computer and a cradle

Abstract Text (1):

A method and apparatus for determining position using a handheld personal computer. A cradle is disclosed that is adapted to couple to a handheld personal computer. In one embodiment, the cradle includes projecting members that capture the handheld personal computer and hold it securely in place. The cradle includes a position determining system that is adapted to determine position. Upon coupling the cradle to a handheld personal computer, the cradle is operable to determine position. Once position is determined, the determined position is displayed on the display of the handheld personal computer. The display can include a display of a moving map and an icon indicating the current position relative to the map. All required hardware and software for storing the map database and for determining position are included within the cradle.

personal



US006496874B1

(12) **United States Patent**
Janky et al.

(10) **Patent No.:** **US 6,496,874 B1**
(45) Date of Patent: **Dec. 17, 2002**

(54) **METHOD AND APPARATUS FOR DETERMINING POSITION USING A HANDHELD PERSONAL COMPUTER AND A CRADLE**

(75) **Inventors:** **Greg Janky, Seattle, WA (US); Bruce Peetz, Los Gatos, CA (US)**

(73) **Assignee:** **Trimble Navigation Limited, Sunnyvale, CA (US)**

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** **09/345,622**

(22) **Filed:** **Jun. 30, 1999**

(51) **Int. Cl.⁷** **G06F 3/00**

(52) **U.S. Cl.** **710/1; 710/15; 710/43; 710/73; 455/517**

(58) **Field of Search** **710/1, 15, 46, 710/72, 73, 102, 17, 18, 43; 702/150; 345/173; 455/517, 552, 553, 426**

(56) **References Cited**

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 6,335,725 B1 * 1/2002 Koh et al. 345/173
 6,405,049 B2 * 6/2002 Herrod et al. 455/517

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Primary Examiner—Jeffrey Gaffin

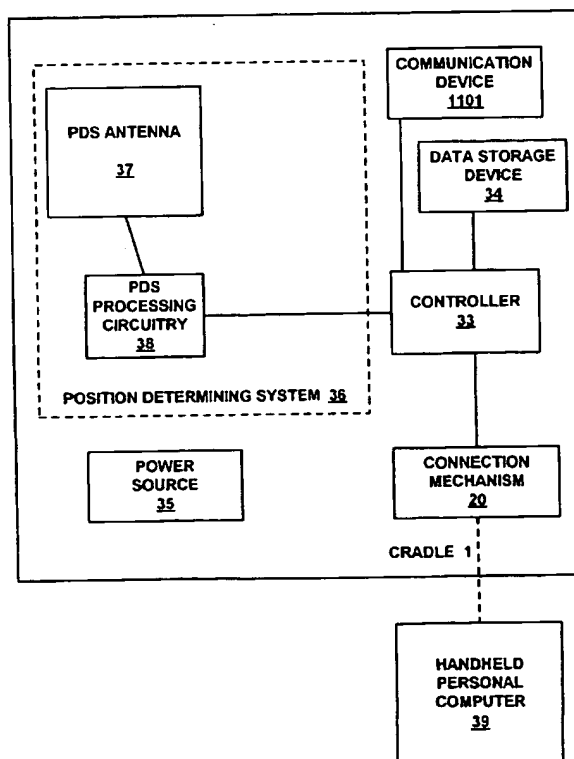
Assistant Examiner—Rijue Mai

(74) *Attorney, Agent, or Firm*—Wagner, Murabito & Hao LLP

(57) **ABSTRACT**

A method and apparatus for determining position using a handheld personal computer. A cradle is disclosed that that is adapted to couple to a handheld personal computer. In one embodiment, the cradle includes projecting members that capture the handheld personal computer and hold it securely in place. The cradle includes a position determining system that is adapted to determine position. Upon coupling the cradle to a handheld personal computer, the cradle is operable to determine position. Once position is determined, the determined position is displayed on the display of the handheld personal computer. The display can include a display of a moving map and an icon indicating the current position relative to the map. All required hardware and software for storing the map database and for determining position are included within the cradle.

13 Claims, 11 Drawing Sheets



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<u>L6</u>	L1 and (handheld and communicat\$ and (updat\$ or merge\$)).ab.	3	<u>L6</u>
<u>L5</u>	L1 and (handhled with communicat\$).ab.	0	<u>L5</u>
<u>L4</u>	L1 and ((handhled with communicat\$) same (updat\$ or merge\$))	0	<u>L4</u>
<u>L3</u>	L1 and (handhled with communicat\$ with (updat\$ or merge\$))	0	<u>L3</u>
<u>L2</u>	L1 and (handhled and communicat\$ and (updat\$ or merge\$)).ab.	0	<u>L2</u>
<u>L1</u>	((709/\$)!.CCLS.)	15629	<u>L1</u>

END OF SEARCH HISTORY

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L6: Entry 3 of 3

File: USPT

Sep 9, 1997

DOCUMENT-IDENTIFIER: US 5666530 A

TITLE: System for automatic synchronization of common file between portable computer and host computer via communication channel selected from a plurality of usable channels there between

Abstract Text (1):

A handheld computer which contains an LCD display having a digitizing surface to allow pen input. Internal storage takes several forms, such as a large flash ROM area, battery-backed up RAM and an optional hard disk drive. Several alternative communication paths are available, such as the previously mentioned modem, a parallel printer port, a conventional serial port, a cradle assembly connected to the host computer, and various wireless short distance techniques such as radio frequency or infrared transmission. The computer can readily communicate with other sources, particularly to a host desktop computer, to allow automated synchronization of information between the host and the handheld system. Preferably the remote synchronization is performed at several user selectable levels. When the handheld computer is in a cradle and actively connected to the host computer, automatic capture of updated data in the host computer is performed. Several synchronization techniques are utilized to keep track of different types of files. In addition, while communication is established the handheld computer can enter a remote control mode, allowing the user access to files and applications not included in the handheld computer.

Current US Cross Reference Classification (1):709/227



US005666530A

United States Patent [19]

Clark et al.

[11] Patent Number: **5,666,530**[45] Date of Patent: **Sep. 9, 1997**

[54] **SYSTEM FOR AUTOMATIC SYNCHRONIZATION OF COMMON FILE BETWEEN PORTABLE COMPUTER AND HOST COMPUTER VIA COMMUNICATION CHANNEL SELECTED FROM A PLURALITY OF USABLE CHANNELS THERE BETWEEN**

[75] Inventors: **Ted H. Clark**, Houston; **Steven C. Malisewski**, Cypress; **Patrick R. Cooper**, Houston; **William Caldwell Crosswy**, Spring; **Larry J. Crochet**, Houston, all of Tex.

[73] Assignee: **Compaq Computer Corporation**, Houston, Tex.

[21] Appl. No.: **984,464**

[22] Filed: **Dec. 2, 1992**

[51] Int. Cl.⁶ **G06F 13/00; G06F 15/17**

[52] U.S. Cl. **395/617; 395/182.18; 395/200.57; 395/825; 364/962; 364/231.2**

[58] Field of Search **364/200, 900, 364/962; 395/200, 275, 600, 182, 825, 617**

[56] **References Cited****U.S. PATENT DOCUMENTS**

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Hall, Edward "Atari's Miniature Portfolio a One Pound Dynamo" *Computing Canada*, Oct. 12, 1989 2 pages.

Primary Examiner—Thomas C. Lee

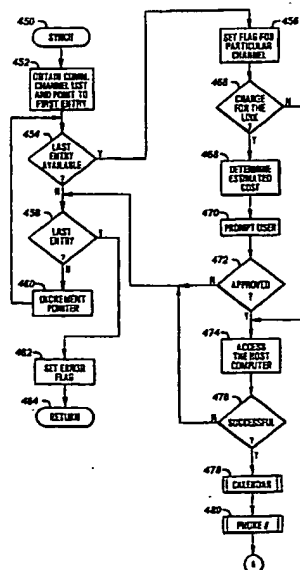
Assistant Examiner—Ki S. Kim

Attorney, Agent, or Firm—Pravel, Hewitt, Kimball & Krieger

[57] **ABSTRACT**

A handheld computer which contains an LCD display having a digitizing surface to allow pen input. Internal storage takes several forms, such as a large flash ROM area, battery-backed up RAM and an optional hard disk drive. Several alternative communication paths are available, such as the previously mentioned modem, a parallel printer port, a conventional serial port, a cradle assembly connected to the host computer, and various wireless short distance techniques such as radio frequency or infrared transmission. The computer can readily communicate with other sources, particularly to a host desktop computer, to allow automated synchronization of information between the host and the handheld system. Preferably the remote synchronization is performed at several user selectable levels. When the handheld computer is in a cradle and actively connected to the host computer, automatic capture of updated data in the host computer is performed. Several synchronization techniques are utilized to keep track of different types of files. In addition, while communication is established the handheld computer can enter a remote control mode, allowing the user access to files and applications not included in the handheld computer.

14 Claims, 10 Drawing Sheets



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L6: Entry 2 of 3

File: USPT

Jul 27, 1999

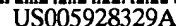
DOCUMENT-IDENTIFIER: US 5928329 A

TITLE: System for automatic synchronization of common file between portable computer and host computer via communication channel selected from a plurality of usable channels therebetween

Abstract Text (1):

A handheld computer which contains an LCD display having a digitizing surface to allow pen input. Internal storage takes several forms, such as a large flash ROM area, battery-backed up RAM and an optional hard disk drive. Several alternative communication paths are available, such as the previously mentioned modem, a parallel printer port, a conventional serial port, a cradle assembly connected to the host computer, and various wireless short distance techniques such as radio frequency or infrared transmission. The computer can readily communicate with other sources, particularly to a host desktop computer, to allow automated synchronization of information between the host and the handheld system. Preferably the remote synchronization is performed at several user selectable levels. When the handheld computer is in a cradle and actively connected to the host computer, automatic capture of updated data in the host computer is performed. Several synchronization techniques are utilized to keep track of different types of files. In addition, while communication is established the handheld computer can enter a remote control mode, allowing the user access to files and applications not included in the handheld computer.

Current US Original Classification (1):709/227Current US Cross Reference Classification (2):709/217Current US Cross Reference Classification (3):709/246



[11] Patent Number: 5,928,329

[45] **Date of Patent:** *Jul. 27, 1999

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Frye computer Systems, Inc., "The Frye Utilities for Network, Software Update and Distribution System", 1992.

Primary Examiner—Thomas C. Lee

*Assistant Examiner—*Ki S. Kim

Attorney, Agent, or Firm—Sharp, Comfort & Merrett, P.C.

[57] **ABSTRACT**

A handheld computer which contains an LCD display having a digitizing surface to allow pen input. Internal storage takes several forms, such as a large flash ROM area, battery-backed up RAM and an optional hard disk drive. Several alternative communication paths are available, such as the previously mentioned modem, a parallel printer port, a conventional serial port, a cradle assembly connected to the host computer, and various wireless short distance techniques such as radio frequency or infrared transmission. The computer can readily communicate with other sources, particularly to a host desktop computer, to allow automated synchronization of information between the host and the handheld system. Preferably the remote synchronization is performed at several user selectable levels. When the handheld computer is in a cradle and actively connected to the host computer, automatic capture of updated data in the host computer is performed. Several synchronization techniques are utilized to keep track of different types of files. In addition, while communication is established the handheld computer can enter a remote control mode, allowing the user access to files and applications not included in the handheld computer.

24 Claims, 10 Drawing Sheets

- [75] **Inventors:** **Ted H. Clark, Houston; Steven C. Mallsewski, Cypress; Patrick R. Cooper, Houston; William Caldwell Crosswy, Spring; Larry J. Crochet, Houston, all of Tex.**
- [73] **Assignee:** **Compaq Computer Corporation, Houston, Tex.**
- [*] **Notice:** This patent is subject to a terminal disclaimer.

[21] Appl. No.: 08/859,073

[22] Filed: May 20, 1997

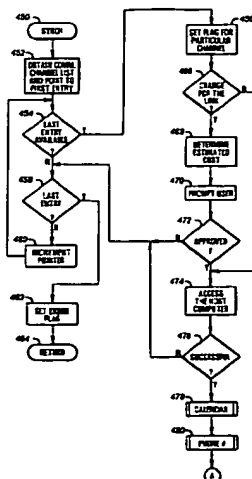
Related U.S. Application Data

- [63] Continuation of application No. 07/984,464, Dec. 2, 1992,
Pat. No. 5,666,530.
- [51] **Int. Cl.**⁶ **G06F 13/14**
- [52] **U.S. Cl.** **709/227; 709/217; 709/246;**
707/201
- [58] **Field of Search** **395/617, 182.18,**
395/200.57, 825; 364/962, 231.2

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,628,152	12/1986	Akerberg	379/51
4,807,182	2/1989	Queen	707/511
4,857,713	8/1989	Chang et al.	707/3
4,875,159	10/1989	Cary et al.	707/203
4,897,781	1/1990	Chang et al.	705/201
4,972,457	11/1990	O'Sullivan	455/556
4,991,197	2/1991	Morris	455/557
5,093,787	3/1992	Simmons	705/33
5,142,619	8/1992	Webster, III	345/343



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L6: Entry 1 of 3

File: USPT

Nov 13, 2001

DOCUMENT-IDENTIFIER: US 6317797 B1

TITLE: System for automatic synchronization of common file between portable computer and host computer via communication channel established with user approval of charge to be incurred

Abstract Text (1):

A handheld computer which contains an LCD display having a digitizing surface to allow pen input. Internal storage takes several forms, such as a large flash ROM area, battery-backed up RAM and an optional hard disk drive. Several alternative communication paths are available, such as the previously mentioned modem, a parallel printer port, a conventional serial port, a cradle assembly connected to the host computer, and various wireless short distance techniques such as radio frequency or infrared transmission. The computer can readily communicate with other sources, particularly to a host desktop computer, to allow automated synchronization of information between the host and the handheld system. Preferably the remote synchronization is performed at several user selectable levels. When the handheld computer is in a cradle and actively connected to the host computer, automatic capture of updated data in the host computer is performed. Several synchronization techniques are utilized to keep track of different types of files. In addition, while communication is established the handheld computer can enter a remote control mode, allowing the user access to files and applications not included in the handheld computer.

Current US Cross Reference Classification (4):709/200Current US Cross Reference Classification (5):709/217Current US Cross Reference Classification (6):709/227

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L7: Entry 1 of 3

File: USPT

Nov 13, 2001

DOCUMENT-IDENTIFIER: US 6317797 B1

TITLE: System for automatic synchronization of common file between portable computer and host computer via communication channel established with user approval of charge to be incurred

Brief Summary Text (15):

Expense account program files are synchronized in a different fashion. When the handheld computer is in communication with the host computer, any time a new file or updated file is present in the handheld computer, it is automatically relayed back to the host computer to allow more permanent storage.

Current US Cross Reference Classification (4):709/200Current US Cross Reference Classification (5):709/217Current US Cross Reference Classification (6):709/227



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(12) **United States Patent**
Clark et al.

(10) Patent No.: **US 6,317,797 B2**
(45) Date of Patent: ***Nov. 13, 2001**

(54) **SYSTEM FOR AUTOMATIC SYNCHRONIZATION OF COMMON FILE BETWEEN PORTABLE COMPUTER AND HOST COMPUTER VIA COMMUNICATION CHANNEL ESTABLISHED WITH USER APPROVAL OF CHARGE TO BE INCURRED**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **09/175,866**

(22) Filed: **Oct. 20, 1998**

Related U.S. Application Data

(63) Continuation of application No. 08/859,073, filed on May 20, 1997, now Pat. No. 5,928,329, which is a continuation of application No. 07/984,464, filed on Dec. 2, 1992, now Pat. No. 5,666,530.

(51) Int. Cl.⁷ **G06F 17/24; G06F 17/30; G06F 15/16; G06F 15/17; G06F 13/14**

(52) U.S. Cl. **710/5; 710/20; 707/200; 707/201; 707/203; 707/511; 709/200; 709/217; 709/227; 714/20**

(58) Field of Search **714/20; 709/227, 709/200, 217, 246; 710/5, 20; 395/617; 364/962, 231.2; 707/200, 201, 203, 511**

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(57) ABSTRACT

A handheld computer which contains an LCD display having a digitizing surface to allow pen input. Internal storage takes several forms, such as a large flash ROM area, battery-backed up RAM and an optional hard disk drive. Several alternative communication paths are available, such as the previously mentioned modem, a parallel printer port, a conventional serial port, a cradle assembly connected to the host computer, and various wireless short distance techniques such as radio frequency or infrared transmission. The computer can readily communicate with other sources, particularly to a host desktop computer, to allow automated synchronization of information between the host and the handheld system. Preferably the remote synchronization is performed at several user selectable levels. When the handheld computer is in a cradle and actively connected to the host computer, automatic capture of updated data in the host computer is performed. Several synchronization techniques are utilized to keep track of different types of files. In addition, while communication is established the handheld computer can enter a remote control mode, allowing the user access to files and applications not included in the handheld computer.

11 Claims, 10 Drawing Sheets

